* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the display-control approach for [of PDP of a matrix display method] mainly controlling contrast, and equipment in more detail about the display-control approach of a plasma display panel (PDP), and equipment.
[0002]
[Description of the Prior Art] PDP is excellent in visibility, and a high-speed display is possible for it, and it is a thin display device with big-screen-izing easy moreover comparatively. Also in the matrix display method, PDP of a field discharge mold is PDP which arranged the display electrode which serves as a pair on the occasion of impression of driver voltage on the same substrate, and is suitable for the color display by the fluorescent substance.
[0003] The color PDP of the field discharge mold of the conventional, for example, AC, drive method has the following composition. That is, while constitutes a panel and it is field discharge (since it is a main stroke for a display, it is called display discharge, or) on a substrate. Many main-electrode pairs for generating called sustain discharge since it is maintenance discharge after the address are arranged horizontal almost in parallel. Stripe-like many septa (rib) are formed almost perpendicularly (direction which intersects a main electrode) in parallel so that two or more address electrodes and these address electrodes for address discharge generating may be inserted on the substrate of another side. The fluorescent substance layer is formed in long and slender Mizouchi between septa the shape of a dot and two or more shape of a stripe corresponding to a discharge cel corresponding to a discharge cel.
[0004] And about the brightness of each pixel at the time of displaying an image, the time-sharing drive in the field is performed and it is made to perform a gradation display. In this time-sharing drive in the field, if brightness is set as eight steps, for example Time sharing of the 1 field is carried out to three subfields (that is, the screen of one sheet consists of displaying the sub screen of three sheets continuously). Weighting is made the three subfields which carried out time sharing so that phase contrast of brightness may be set to 1:2:4, and the count of lighting (discharge) of the discharge cel (pixel) according to the weight is set as them.
[0005] And a gradation display is performed by controlling lighting of each discharge cel and making each discharge cel turn on at the time of the display of a desired subfield. In displaying a certain discharge cel by the brightness of brightness phase contrast "3", he makes the discharge cel turn on at the time of the display of the subfield of the weight of brightness phase contrast "1", and the subfield of the weight of brightness phase contrast "2", and is trying to specifically set brightness phase contrast to "3 (1+2)." Moreover, in displaying a certain discharge cel by the brightness of brightness phase contrast "5", he makes the discharge cel turn on at the time of the display of the subfield of the weight of brightness phase contrast "1", and the subfield of the weight of brightness phase contrast "4", and is trying to set brightness phase contrast to "5 (1+4)."
[0006] In addition, the "field" in this specification is the unit image of the image display of time series, for example, in the case of television of NTSC system, means each field of the frame of an interlace

format, and, in the case of the non-interlaced format represented by the computer output, means the frame itself.
[0007]
[Problem(s) to be Solved by the Invention] However, in such conventional PDP, although various kinds of devices are made according to the request of a raise in contrast which is a request of a common need person in order to raise contrast, there are some persons who there are various demands for those [some] who look at a screen, for example, desire a low screen of contrast.
[0008] In addition, as PDP which can perform the brilliance control of a screen, a means to change the discharge conditions of the pre-discharge of initialization of a publication performed for accumulating is formed in JP,9-325735,A, the brightness of luminescence by the pre-discharge is controlled, and the thing to which made it make a brilliance control perform is known, without spoiling the number of gradation.
[0009] This invention offers the display-control approach of the plasma display panel which can adjust contrast simply only by controlling a display, and equipment, without having been made in consideration of such a situation and changing the basic structure of the conventional PDP.
[0010]
[Means for Solving the Problem] By dividing the 1 field into two or more subfields, and controlling lighting of each subfield, this invention is the display-control approach of a plasma display panel of performing a gradation display, and is the display-control approach of the plasma display panel characterized by making at least one of said two or more of the subfields into the subfield for adjusting the contrast of a screen.
[0011] This invention is the display control of the plasma display panel which performs a gradation display using a subfield again, and is the display control of the plasma display panel which comes to have the dividing network which divides the 1 field for image display into two or more subfields where the weight of brightness differs, the gradation display circuit which performs a gradation display by controlling lighting of each subfield, and the contrast equalization circuit which makes all the discharge cels that constitute a screen about the specific subfield of said two or more subfields turn on.
[0012] Since according to this invention it faces dividing the 1 field into two or more subfields, and performing a gradation display and at least one of two or more subfields was used as a subfield for adjusting the contrast of a screen For example, about the specific subfield in two or more subfields, when it is made to turn on all the discharge cels that constitute a screen, the brightness of a low discharge cel of brightness can be raised most, and, thereby, the contrast of a screen can be adjusted.
[0013]
[Embodiment of the Invention] If the structure of PDP of this invention and the manufacture approach of PDP are PDP(s) of a matrix display method, even if DC mold, AC mold, a field discharge mold, an opposite discharge mold, 2 electrode structures, 3 electrode structures, etc. are which PDP(s), they can apply them.
[0014] In this invention, substrates, such as glass, a quartz, and silicon, and the substrate in which desired structures, such as an electrode, an insulator layer, a dielectric layer, and a protective coat, were formed on these substrates are contained as a substrate of a pair.
[0015] As a septum, what was formed by well-known approaches, such as screen-stencil and sandblasting, is contained using the well-known septum ingredient of the shape of a paste which mixed the solvent with low-melting-glass powder and resin, for example. As low melting glass, PbO-B2O2-SiO2 system glass etc. can be used, for example.
[0016] although it is possible as an electrode to apply each electrode, such as a transparent electrode and a metal electrode, if it is a transparent electrode -- ITO and SnO2 etc. -- it is desirable to use Cr/Cu/Cr etc., if it is a metal electrode.
[0017] In this invention, which subfield of the subfield which carried out time sharing on the occasion of the time-sharing drive in the field as a subfield for adjusting the contrast of a screen may be used. For example, if it is the case where adjustment to which only a few reduces contrast is performed, phase contrast of brightness should just make all discharge cels turn on in the smallest subfield. Moreover, if it

is the case where adjustment to which contrast is reduced greatly is performed, phase contrast of brightness should just make all discharge cels turn on in the largest subfield. Moreover, if it is the case where he wants to adjust contrast in these middle, phase contrast of brightness should just make all discharge cels turn on in the subfield which is middle extent.
[0018] In this invention, gradation means the phase of brightness and a gradation display means establishing and displaying a phase on brightness. Moreover, contrast means the ratio or difference of the maximum brightness and the minimum brightness in a screen.
[0019] Hereafter, based on the gestalt of operation shown in a drawing, this invention is explained in full detail. In addition, this invention is not limited by this.
[0020] Drawing 1 is the block diagram of the plasma display concerning this invention. The plasma display 100 consists of drive units 80 for making the cel C which constitutes PDP1 and Screen (screen) SC of the AC mold 3 electrode-surface discharge structure which is the color display device of a matrix type and which was located in a line in all directions turn on alternatively, and is used as a wall-type television receiver, a monitor of a computer system, etc.
[0021] PDP1 is PDP of 3 electrode-surface discharge structure where parallel arrangement of the sustain electrodes X and Y as 1st [which makes a pair], and 2nd electrodes for main strokes is carried out, and the address electrode A as the sustain electrodes X and Y and the 3rd electrode crosses in each cel C. The sustain electrodes X and Y are prolonged in the line writing direction (horizontal direction) of a screen, and one sustain electrode Y is used as a scanning electrode for choosing Cel C per line on the occasion of addressing. The address electrode A is prolonged in the direction of a train (perpendicular direction), and is used as a data electrode for choosing Cel C per train. The field where a sustain electrode group and an address electrode group cross is a viewing area SC, i.e., a screen.
[0022] The drive unit 80 has a controller 81, a frame memory 82, the data-processing circuit 83, the subfield memory 84, the power circuit 85, the X driver 87, the Y driver 88, and the address driver 89. The field data Df of the pixel unit which shows the intensity level (gradation level) of each color of G (green), B (blue), and R (red) from external devices, such as TV tuner and a computer, is inputted into the drive unit 80 with various kinds of synchronizing signals.
[0023] Once field data Df is stored in a frame memory 82, it is sent to the data-processing circuit 83. The data-processing circuit 83 divides the 1 field into the subfield of a predetermined number, in order to perform a gradation display, is a data-conversion means to set up the combination of the subfield made to turn on of them, and outputs the subfield data Dsf according to field data Df. The subfield data Dsf are stored in the subfield memory 84. The values of each bit of the subfield data Dsf are the information which shows the necessity of lighting of the cel in a subfield, and information which shows the necessity of address discharge strictly.
[0024] The X driver 87 impresses driver voltage to the sustain electrode X, and the Y driver 88 impresses driver voltage to the sustain electrode Y. The address driver 89 impresses driver voltage to the address electrode A according to the subfield data Dsf. Predetermined power is supplied to these drivers from a power circuit 85.
[0025] Drawing 2 is the perspective view showing the internal structure of PDP1. As for PDP1, the pair [every] sustain electrodes (display electrode) X and Y are arranged by the inside of the glass substrate 11 by the side of a front face at every line L. Line L is a horizontal cel train in a screen. The sustain electrodes X and Y are formed by the metal membrane (bus electrode) 42 which consists of transparence electric conduction film 41 with which each consists of ITO, and Cr-Cu-Cr, and are covered with the dielectric layer 17 with a thickness of about 30 micrometers it is thin from low melting glass. 1000A of thickness numbers of protective coats 18 which consist of a magnesia (MgO) are formed in the front face of a dielectric layer 17. The address electrode A is arranged on the wrap substrate layer 22 in the inside of the glass substrate 21 by the side of a tooth back, and is covered with the dielectric layer 24 with a thickness of about 10 micrometers. On the dielectric layer 24, the septum 29 of the shape of a stripe with a height of 150 micrometers is formed at a time between [one] each address electrode A. Discharge space 30 is divided by the line writing direction by these septa 29 at every subpixel (unit luminescence field), and the gap dimension of discharge space 30 is specified. And the fluorescent

substance layers 28R, 28G, and 28B of the shape of a stripe of three colors of R, G, and B for color display are prepared for long and slender Mizouchi between septa so that the insides by the side of a tooth back including the upper part of the address electrode A and the side face of a septum 29 may be covered. The arrangement pattern of three colors is a stripe pattern with which the luminescent color of the trains which the luminescent color of the cel of one train is the same, and adjoins differs. In addition, it is desirable to color the summit section the dark color on the occasion of septum formation, in order to raise contrast, to color other parts white, and to raise the reflection factor of the light. Coloring can be performed by adding the pigment of a predetermined color to the glass paste of an ingredient.

[0026] The neon of a principal component is filled up with the discharge gas which mixed the xenon in discharge space 30 (charged pressure is 500Torr(s)), and the fluorescent substance layers 28R, 28G, and 28B are locally excited by the ultraviolet rays which a xenon releases at the time of discharge, and emit light by them. 1 pixel (pixel) of a display consists of three subpixel on a par with a line writing direction. The structure in each subpixel is a cel (display device). Since the arrangement pattern of a septum 29 is a stripe pattern, the part corresponding to each train of the discharge space 30 is continuing in the direction of a train ranging over all the lines L. Therefore, the dimension of the inter-electrode spare time (reverse slit) of adjoining line L is fully larger than the field discharging gap (for example, value within the limits of 50-150 micrometers) of each line L, and is selected by the value (for example, value within the limits of 150-500 micrometers) which can prevent discharge association of the direction of a train. In addition, you may make it prepare the light-shielding film (the so-called black stripe) which is not illustrated to an external surface [of the substrate 11 by the side of a front face], or inside side in a reverse slit in order to hide a nonluminescent whitish fluorescent substance layer.

[0027] Drawing 3 is the explanatory view showing an example of the display control of this invention. In the display by PDP1, in order for binary lighting control to perform gradation reappearance, time sharing of each frame of the time series which is an input image is carried out to eight subframes as carried out from the former. In other words, a frame is transposed to the set of eight subframes. However, in reproducing the image scanned in the interlace format like television of NTSC system, it divides each field into eight subfields. Hereafter, one frame F explains as what consists of the 2 fields f.

[0028] And after dividing each field f into eight subfields sf1, sf2, sf3, sf4, sf5, sf6, sf7, and sf8 in this way, weighting is carried out so that the rate of phase contrast of the brightness in these subfields sf1-sf8 may serve as 1:2:4:8:16:32:64: [128], and the count of luminescence of the sustain of each subfields sf1-sf8 (it is also called the count of discharge or the count of lighting) is set up. In this case, since 256 steps of brightness setup can be performed for every color of RGB in the combination of lighting / astigmatism LGT of a subfield unit, the number of the colors which can be displayed is 2563. It becomes. Although it was the case where the 1 field f was divided into eight, when it divides into nine, this is [5123 and] 10243 when it divides into ten. It becomes.

[0029] Drawing 3 shows the scan condition to one line - N line of the discharge cel arranged in the shape of a matrix. The 1 field f was divided into five subfields sf1, sf2, sf3, sf4, and sf5, and this drawing showed the example which divides further each subfield sfj (j= 1, 2, 3, 4, 5) into the common address period TA and the sustain period TS in time over a full screen, and performs a gradation display, in order to simplify explanation. Generally this method is called an ADS subfield method.

[0030] In the address period TA, the sustain electrode Y is used as a scan (scan) electrode, a screen is scanned by using the address electrode A as a signal electrode, and wall charge is formed in a discharge cel to make it turn on. Next, in the sustain period TS, discharge occurs only in the discharge cel in which wall charge was formed, and in other discharge cels, an electrical potential difference which discharge does not generate is impressed by turns between the sustain electrode X and the sustain electrode Y, sustain discharge is performed, and it displays by making a desired discharge cel turn on by continuing this.

[0031] And in adjusting contrast, in the case of the display of the subfield sf2 shown for example, with the slash in drawing, the discharge cels of all screens are made to turn on (complete lighting), and it adjusts contrast of a screen.

[0032] Thus, the brightness of the background can be raised by performing complete lighting about a

subfield with weighting of a certain brightness phase contrast, and contrast can be adjusted by it. When the rise of the brightness of the background can be suppressed small, contrast can be finely tuned, when which subfield may be chosen and the small subfield of weighting of brightness phase contrast is chosen, and the big subfield of weighting of brightness phase contrast is chosen, the subfield which performs complete lighting can enlarge the rise of the brightness of the background, and can adjust contrast greatly.

[0033] For example, what is necessary is just to choose the subfield made to turn on completely so that tooth-back luminescence brightness may become 20 cd/m2, in order to make contrast or less into 15:1, if the maximum brightness is made into 300 cd/m2.

[0034] Moreover, the fall of the contrast by the outdoor daylight in a real service condition (ordinary room) is foreseen, and you may make it, limit the subfield made to turn on completely to the subfield of weighting of the minimum luminescence brightness for example.

[0035] The optimal contrast can be acquired by choosing the subfield which forms selection means, such as a switch and volume, in the exterior of an indicating equipment, and may enable it to choose the subfield of arbitration from the exterior about selection of the subfield made to turn on completely, thus is made to turn on completely according to change of outdoor daylight conditions.

[0036] Above, although the ADS subfield method was explained, also in the method generally called a line sequential drive method as shown in drawing 4 , the above-mentioned complete lighting can adjust contrast.

[0037] This line sequential drive method is a method which faces scanning sequentially one line - N line of the discharge cel arranged in the shape of a matrix unlike an ADS subfield method, does not shift to sustain discharge after address discharge of all Rhine finishes, but shifts to sustain discharge immediately after performing address discharge for every line.

[0038] In order to simplify explanation, the 1 field f was divided into four subfields sf1, sf2, sf3, and sf4, and this drawing showed the example which performs sustain discharge immediately, after scanning all Rhine for every subfield.

[0039] When this line sequential drive method adjusts contrast, in the case of the display of the subfield sf2 shown for example, with the slash in drawing, all discharge cels are made to turn on and contrast of a screen is adjusted. The subfield which performs complete lighting may choose which subfield like the above-mentioned ADS.

[0040] Drawing 5 - drawing 11 are the explanatory views showing an example of the voltage waveform impressed to each electrode in the case of driving PDP by the ADS subfield method. One frame was made into the 2 fields and these drawings showed the example which divided each field into eight subfields to sf1-sf8.

[0041] Each subfield period Tsfj consists of an address preparation period TR, and the address period TA and the sustain period TS. Although it explained that each subfield consisted of an address period TA and a sustain period TS in order to simplify explanation in the above, the preparation period for addressing is included in fact at the address period TA.

[0042] For example, the address preparation period TR for eliminating the wall charge of all discharge cels beforehand, and eliminating the wall charge of all discharge cels, before performing address discharge in driving by the method (it generally writes in and called an address system) which forms wall charge only in a discharge cel to make it turn on is required. This may put it in another way as the elimination period after performing sustain discharge.

[0043] Moreover, to drive by the method (generally called an elimination address system) which eliminates the wall charge of the discharge cel which is not turned on, before performing address discharge, the address preparation period TR for forming wall charge in homogeneity is required [wall charge is beforehand formed in all discharge cels at homogeneity, and] for all discharge cels. This may put it in another way as between the wall charge formative periods after performing sustain discharge.

[0044] Drawing 5 is the explanatory view showing an example of the voltage waveform impressed to each electrode in the case of driving with a write-in address system, and explains first the case where it drives with a write-in address system.

[0045] As shown in this drawing, when driving with a write-in address system, in the address preparation period TR (a drawing destructive line encloses and shows) Hold the potential of the address electrode A on an electrical potential difference Vaw, and it is made for discharge not to arise between the sustain electrodes X and Y and the address electrode A. The continuation pulse Pr 1 is impressed to the sustain electrode Y for a sustain pulse and the same wave-like (electrical potential difference Vs) continuation pulse Pr 1 at the sustain electrode X following the meantime. After continuing sustain discharge, all the discharge pulses Pr 2 whose peak value is about 1.5 times (electrical potential difference Vw) the sustain pulses Ps and whose pulse width is about about 2 times of the sustain pulse Ps are impressed to the sustain electrode X, and all discharge cels are made to discharge. Then, all the potentials of the address electrode A, the sustain electrode X, and the sustain electrode Y are held to "0", self-elimination discharge is generated, and the wall charge of all discharge cels is eliminated.
[0046] In the next address period TA, holding the potential of the sustain electrode X on an electrical potential difference Vax, and impressing the scanning pulse Py (electrical potential difference - Vy) to the sustain electrode Y between them, the address pulse Pa (electrical potential difference Va) is impressed to the desired address electrode A, and address discharge is performed.
[0047] And in the next sustain period TS, since the address electrode A is held on an electrical potential difference Vaw and sustain discharge is produced certainly, after impressing the first time sustain pulse Ps2 with width of face wider than the usual sustain pulse Ps, the 1st usual sustain pulse Ps is impressed to the sustain electrode X and the sustain electrode Y by turns, and the last is impressed to the sustain electrode Y and ends sustain discharge.
[0048] Although the address preparation period TR of the subfield which you are going to make it turn on completely is made to once turn on all discharge cels in the drive of such a write-in address system when performing complete lighting in the subfield period of arbitration mentioned above for adjustment of contrast, it is not necessary to perform elimination after this. For this reason, the subsequent address period TA is omissible by the self-elimination discharge after making all discharge cels turn on being made not to be performed.
[0049] Drawing 6 is the explanatory view showing the voltage waveform impressed to each electrode in the case of omitting the address period TA on the occasion of a drive with a write-in address system. After making all discharge cels turn on, it is made for self-elimination discharge not to arise in the drive of a write-in address system in the address preparation period TR (for a drawing destructive line to enclose and show) of the subfield which you are going to make it turn on completely, when performing complete lighting at the subfield period of arbitration and adjusting contrast, as shown in this drawing. That is, the continuation pulse Pr 1 is not impressed to the sustain electrodes X and Y, but the **** pulse Pr 3 to which it falls to the sustain electrode X by the same width of face as all the discharge pulses Pr 2 and the same height, and an electrical potential difference sometimes falls gradually is impressed. Since the condition that wall charge was formed in all discharge cels is maintainable by this, it shifts to the next sustain period TS as it is, and address discharge can be omitted by performing sustain discharge.
[0050] When driving with a write-in address system, thus, at the time of the address of the usual subfield Although wall charge is formed in the discharge cel which is made to generate discharge and should be turned on by line sequential scanning actuation between the address electrode A of the discharge cel which should be turned on, and the sustain electrode Y after eliminating the wall charge of all discharge cels When performing complete lighting at a desired subfield period and adjusting contrast, since the address actuation to each discharge cel becomes unnecessary, address time amount can be shortened about the subfield.
[0051] What is necessary is just not to make all discharge cels turn on and to eliminate in the address preparation period TR of the next subfield after performing complete lighting at the subfield period of the request for adjustment of contrast, when driving with this write-in address system. Therefore, this point is explained below.
[0052] Drawing 7 is the explanatory view showing the voltage waveform impressed to each electrode in the case of performing only elimination of a discharge cel on the occasion of a drive with a write-in

address system at the address preparation period TR. Since all discharge cels are on in the front subfield, it is not necessary to make a discharge cel turn on in the drive of a write-in address system in the address preparation period TR (for a drawing destructive line to enclose and show) of the next subfield after performing complete lighting at a desired subfield period, as shown in this drawing. For this reason, what is necessary is for width of face to impress about 1/of narrow width pulses Pr 4 for elimination of 2 in the height same to the sustain electrode X as the sustain pulse Ps, and to perform only elimination of the wall charge of all discharge cels.

[0053] You may make it impress the **** pulse Pr 5 for elimination of the minus to which an electrical potential difference falls gradually at the address preparation period TR (a drawing destructive line encloses and shows) of the next subfield of complete lighting to the sustain electrode Y as this blanking pulse, as shown in above-mentioned drawing 8 instead of the narrow width pulse Pr 4 for elimination.

[0054] Thus, in driving with a write-in address system, it is good as behind the subfield made to turn on completely for adjustment of contrast impresses the narrow width pulse for elimination, or the **** pulse for elimination to the sustain electrode X or the sustain electrode Y, and it becomes unnecessary operating [make all discharge cels turn on] it. . Although the case where it drove with a write-in address system was explained above, the case where it next drives with an elimination address system is explained.

[0055] Drawing 9 is the explanatory view showing an example of the voltage waveform impressed to each electrode in the case of driving PDP with an elimination address system. As shown in this drawing, when driving with an elimination address system, in the address preparation period TR (a drawing destructive line encloses and shows main parts) Hold the potential of the address electrode A on an electrical potential difference Va, make it discharge not arise between the sustain electrodes X and Y and the address electrode A, and a sustain pulse and the same wave-like continuation pulse Pr 1 are impressed to the sustain electrode X between them. From the same height as the sustain pulse Ps to one about 1.2 times (electrical potential difference Vxw) the height of this, after continuing sustain discharge, peak value changes to the sustain electrode X in two steps. All the 2 discharge pulses Pr 7 are impressed, respectively. the [whose pulse width is about about 3 times of the sustain pulse Ps] -- all the 1 discharge pulses Pr 6 -- the sustain electrode Y -- an electrical potential difference -Vyw and pulse width -- the -- the [as all the 1 discharge pulses Pr 6 / same] -- The discharge cel which did not discharge by the last continuation pulse Pr 1 is made to discharge. Then, only predetermined time holds altogether the potential of the address electrode A, the sustain electrode X, and the sustain electrode Y to "0", only a few generates self-elimination discharge, then, the sustain pulse Ps and height are the same as the sustain electrode Y, the **** pulse (charge reversal pulse) Pr 8 to which an electrical potential difference falls gradually is impressed at the time of falling it is twice [about] whose width of face of this, and the polarity of the wall charge of all discharge cels is reversed.

[0056] In the next address period TA, holding the potential of the sustain electrode X to "0", and impressing the scanning pulse Py (electrical potential difference - Vy) to the sustain electrode Y between them, the address pulse Pa (electrical potential difference Va) is impressed to the desired address electrode A, and address discharge is performed.

[0057] Since the address electrode A is held on an electrical potential difference Va for every impression of the sustain pulse Ps and sustain discharge is certainly produced in the next sustain period TS, and only the 1st time After impressing two steps of first time sustain pulses Ps3 with width of face wider than the usual sustain pulse Ps, the usual sustain pulse Ps is impressed to the sustain electrode X and the sustain electrode Y by turns, and the last is impressed to the sustain electrode Y and ends sustain discharge.

[0058] Also in the drive of such an elimination address system, although adjustment of contrast is possible, since it is not necessary to eliminate wall charge after making the address preparation period TR of the subfield which you are going to make it turn on completely turn on all discharge cels when performing complete lighting in the subfield period of arbitration mentioned above for adjustment of this contrast, the subsequent address period TA is omissible.

[0059] Drawing 10 is the explanatory view showing the voltage waveform impressed to each electrode

in the case of omitting the address period TA on the occasion of a drive with an elimination address system. As shown in this drawing, when performing complete lighting at the subfield period of arbitration and adjusting contrast, since it is not necessary to eliminate wall charge after making all discharge cels turn on, by the drive of an elimination address system, the subsequent address period TA can be omitted in the address preparation period TR (a drawing destructive line encloses and shows main parts) of the subfield which you are going to make it turn on completely.

[0060] When driving with an elimination address system, thus, at the time of the address of the usual subfield Although the wall charge of the discharge cel which is made to generate discharge and is not turned on between the address electrode A of the discharge cel which is not turned on and the sustain electrode Y by line sequential scanning actuation is eliminated after forming wall charge in all discharge cels When performing complete lighting at a desired subfield period and adjusting contrast, since the address actuation to each discharge cel becomes unnecessary, address time amount can be shortened about the subfield.

[0061] in the address preparation period TR of the next subfield after performing complete lighting at the subfield period of the request for adjustment of contrast, when driving with this elimination address system, after making the discharge cel of an astigmatism LGT discharge in a front subfield, the polarity of the wall charge of all discharge cels is not reversed, and the polarity of the wall charge of all discharge cels is reversed -- being sufficient . Therefore, this point is explained below.

[0062] Drawing 11 is the explanatory view showing the voltage waveform impressed to each electrode in the case of performing only charge reversal of a discharge cel on the occasion of a drive with an elimination address system at the address preparation period TR. since there is no discharge cel of an astigmatism LGT in a front subfield in the address preparation period TR (a drawing destructive line encloses and shows main parts) of the next subfield after performing complete lighting at a desired subfield period as shown in this drawing, it is not necessary to make the discharge cel of an astigmatism LGT discharge in a front subfield, and the polarity of the wall charge of a discharge cel is reversed -- being sufficient . For this reason, what is necessary is to impress the same **** pulse Pr 8 as what was shown in the sustain electrode Y at drawing 9 , and to perform only polar reversal of the wall charge of all discharge cels.

[0063] Thus, in driving with an elimination address system, since distribution of the wall charge in a panel is uniform, it becomes unnecessary operating [make the discharge cel of an astigmatism LGT turn on in a front subfield] behind the subfield made to turn on completely for adjustment of contrast that what is necessary is just to perform charge reversal by the **** pulse.

[0064] Although the display control for adjusting contrast above was explained The dividing network which divides the 1 field for image display into the interior of the data-processing circuit 83 which showed the circuit which performs this display control to drawing 1 in two or more subfields where the weight of brightness differs, The gradation display circuit which performs a gradation display by controlling lighting of each subfield, It is incorporated about the specific subfield of two or more divided subfields as a contrast equalization circuit which makes all the discharge cels that constitute a screen turn on, and these circuits can adjust the contrast of a screen.

[0065] Thus, the contrast of a screen can be adjusted by performing complete lighting of a discharge cel at a desired subfield period. Therefore, the drive unit of the usual PDP manufactured as gradation control performed in an ADS subfield method is received. If it enables it to add the function in which complete lighting of a discharge cel can be performed to a desired subfield period by the addition of ROM etc. It can become possible using the same drive unit to adjust the contrast of a screen to arbitration, modification of a production line can be suppressed to the minimum, and PDP with the best contrast can be obtained.

[0066]

[Effect of the Invention] According to this invention, the 1 field is divided into two or more subfields. Since at least one of two or more of the subfields was used as a subfield for adjusting the contrast of a screen in performing a gradation display by controlling lighting of each subfield For example, about the specific subfield in two or more subfields, when it is made to turn on all the discharge cels that

constitute a screen, the brightness of a low discharge cel of brightness can be raised most, and, thereby, the contrast of a screen can be adjusted. Therefore, the contrast of a screen can be adjusted easily, without changing the basic structure of PDP.

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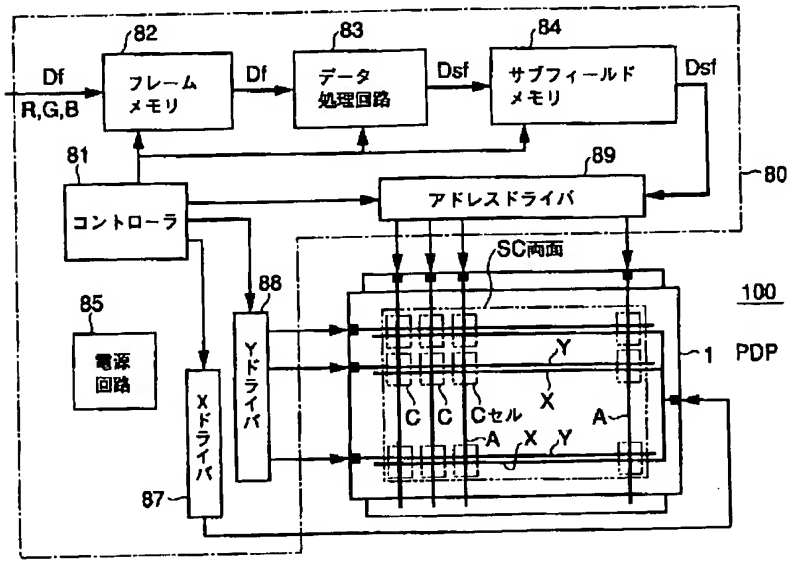
DRAWINGS

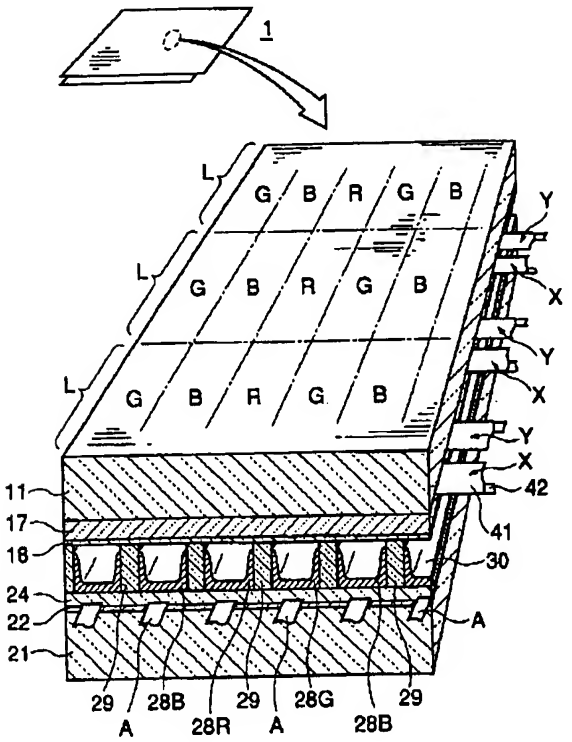
[Drawing 1]

本発明に係るプラズマ表示装置の構成図



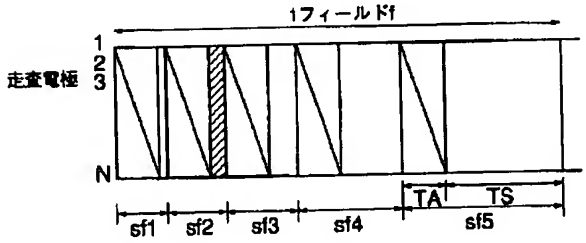
[Drawing 2]

PDPの内部構造を示す斜視図



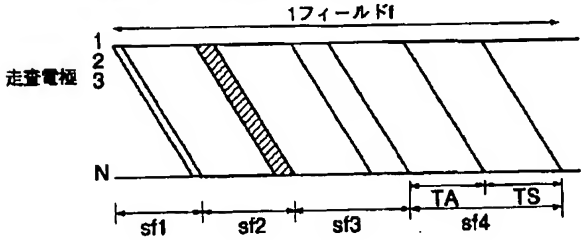
[Drawing 3]

ADSサブフィールド方式でマトリクス状に配置された放電セルを走査する状態を示す説明図



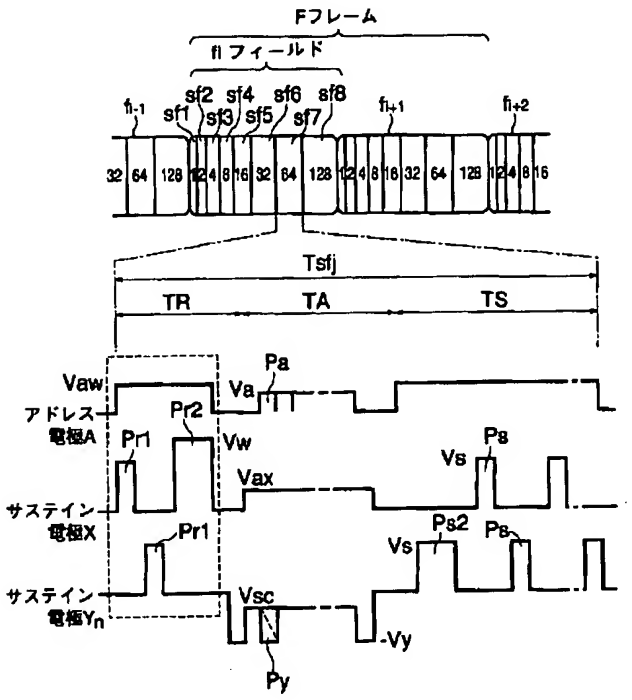
[Drawing 4]

線順次駆動方式でマトリクス状に配置された放電セルを走査する状態を示す説明図



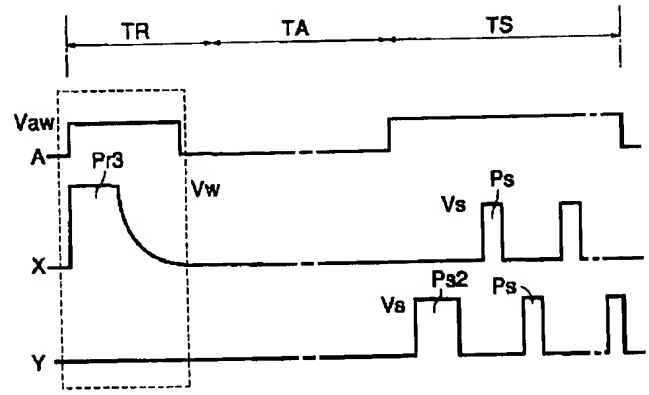
[Drawing 5]

書き込みアドレス方式で駆動する場合の各電極に印加する電圧波形の一例を示す説明図



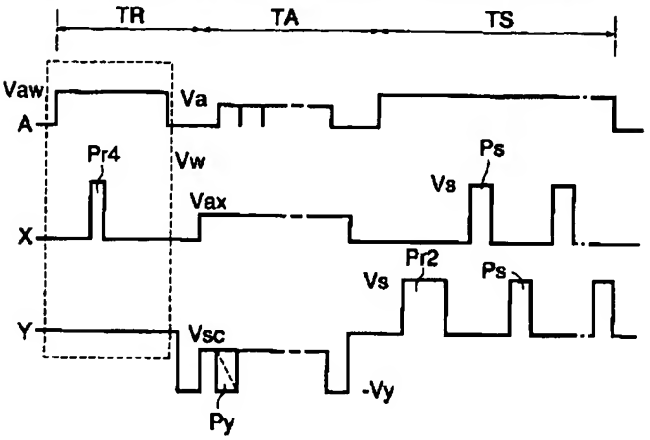
[Drawing 6]

書き込みアドレス方式での駆動に際しアドレス期間を省略する場合の各電極に印加する電圧波形を示す説明図



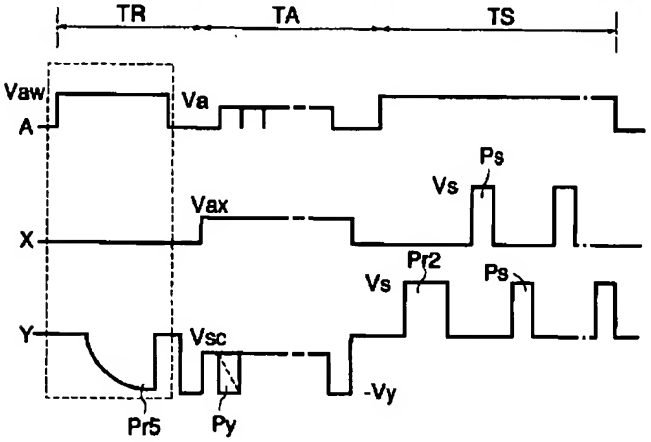
[Drawing 7]

書き込みアドレス方式での駆動に際しアドレス準備期間に放電セルの消去のみを行う場合の各電極に印加する電圧波形を示す説明図



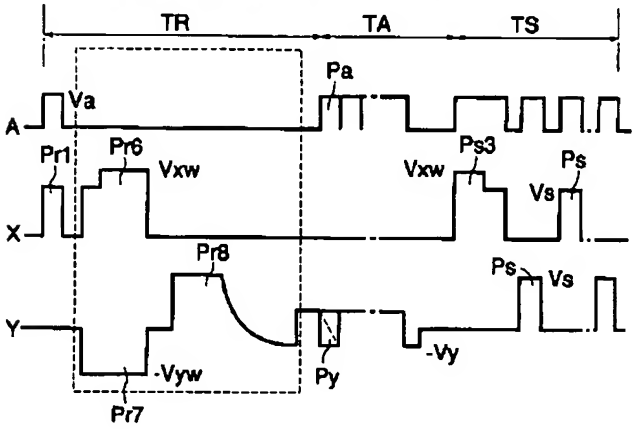
[Drawing 8]

書き込みアドレス方式での駆動に際しアドレス準備期間に放電セルの消去のみを行う場合の各電極に印加する電圧波形の他の例を示す説明図



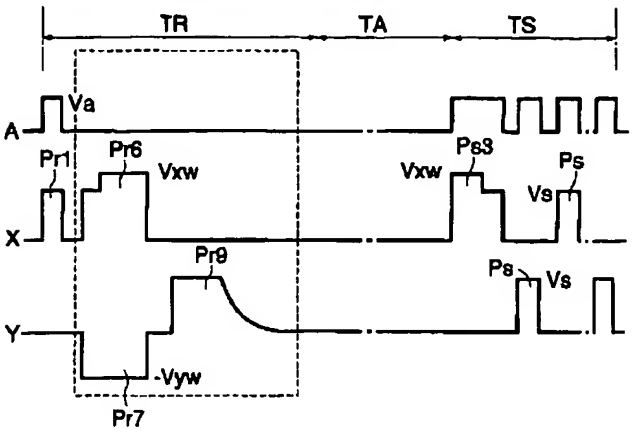
[Drawing 9]

消去アドレス方式でPDPを駆動する場合の各電極に印加する電圧波形の一例を示す説明図



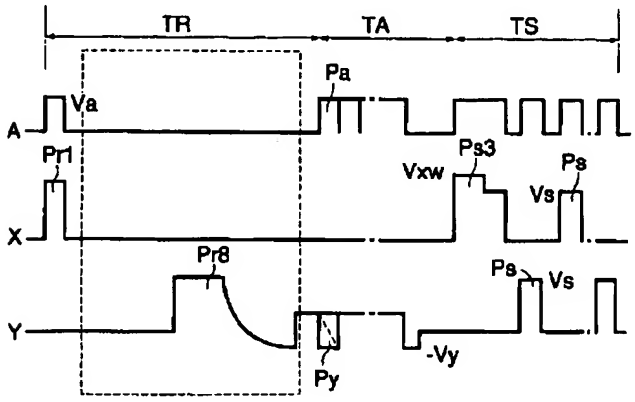
[Drawing 10]

消去アドレス方式での駆動に際しアドレス期間を省略する場合の各電極に印加する電圧波形を示す説明図



[Drawing 11]

消去アドレス方式での駆動に際しアドレス準備期間に放電セルの電荷反転のみを行う場合の各電極に印加する電圧波形を示す説明図



[Translation done.]